



Application of Agile Methodologies and Performance of Humanitarian Projects at Mahama Refugee Camp in Kirehe District, Rwanda

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Abstract: This study assessed the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda. The study adopted a mixed-methods approach using a descriptive and correlational research design. The target population comprised 423 respondents, from which a sample of 206 respondents was determined using Yamane's formula. Stratified and purposive sampling techniques were used. Data were collected through questionnaires, interviews, and documentary review and analyzed using SPSS Version 25. Descriptive statistics, Pearson correlation, and simple linear regression were used for quantitative analysis, while qualitative data were analyzed thematically. Descriptive findings indicated that the Scrum framework was generally well practiced, particularly in improving sprint completion, team velocity, task adaptability, coordination, monitoring, stakeholder feedback, and responsiveness to changing project needs. Pearson correlation showed a strong positive and statistically significant relationship between the Scrum framework and humanitarian project performance ($r = 0.689$, $p = 0.000$). Regression analysis showed that the Scrum framework significantly influenced humanitarian project performance and explained 47.4% of the variation in project performance ($R^2 = 0.474$, $F = 138.869$, $\beta = 0.689$, $p = 0.000$). The study concluded that effective application of the Scrum framework contributes substantially to humanitarian project performance. It recommends strengthening sprint planning and task adaptability, regular Scrum meetings and team coordination, and continuous monitoring and feedback mechanisms to improve the implementation of humanitarian projects.

Keywords: Scrum Framework; Humanitarian Projects; Project Performance; Sprint Planning; Task Adaptability; Team Coordination; Mahama Refugee Camp

How to cite this work (APA):

Ingabire, J. S. & Kwena, R. (2026). Application of Agile Methodologies and Performance of Humanitarian Projects at Mahama Refugee Camp in Kirehe District, Rwanda. Journal of Research Innovation and Implications in Education, 10(3), 2010 – 2023. <https://doi.org/10.59765/dra3y>

1. Introduction

The successful delivery of humanitarian projects is one of the most critical components of interventions aimed at vulnerable populations (Oprah, 2023). Humanitarian projects are often established to provide essential services such as water supply, health care, and sanitation to large, resource-constrained populations living under high-

demand conditions. Ensuring the performance of such projects is essential because it directly affects beneficiaries' well-being, service continuity, and overall quality of life. Project performance in this context involves timely completion, budget adherence, operational efficiency, quality of output, and the capacity to adapt to evolving needs. However, humanitarian projects frequently face challenges such as unpredictable demand, complex logistics, fluctuating funding, and the need to coordinate

multiple stakeholders; if not properly managed, these challenges may result in delays, cost overruns, or compromised service delivery, thereby reducing the effectiveness of the project (Hassan & Abdu, 2024).

Globally, the management and performance of humanitarian projects have become increasingly complex due to rising displacement, climate-induced disasters, and environmental degradation, which together create an urgent need for efficient and adaptive project delivery (UNHCR, 2023). For instance, in 2023, over 110 million people were forcibly displaced worldwide, placing enormous pressure on humanitarian actors to deliver high-performing services, yet the average provision in many operations remained below the minimum humanitarian standards (UNHCR, 2024). In projects such as water, sanitation, and health interventions, ensuring operational efficiency, service reliability, adaptability to changing conditions, and compliance with quality standards becomes a key indicator of project success. Monitoring performance therefore involves not only physical outputs but also service continuity, response times to operational challenges, stakeholder satisfaction, and resilience under unpredictable circumstances (UNHCR, 2024).

In developed countries, large-scale projects have increasingly adopted modern project management approaches, particularly Agile methodologies, to enhance performance and delivery outcomes (Serrador & Pinto, 2024). Agile practices such as iterative planning, continuous monitoring, adaptive resource allocation, and active stakeholder collaboration have been shown to improve project efficiency, reduce delays, optimize cost management, and maintain high-quality outputs (Leech & Hanslo, 2025). Although these practices were initially developed for software and IT projects, their underlying principles, including flexibility, responsiveness, and iterative feedback loops, have been successfully adapted to infrastructure, public-sector, and humanitarian projects. Applying Agile principles to humanitarian projects can significantly enhance performance by enabling teams to respond quickly to operational challenges, make data-driven adjustments based on real-time monitoring, and maintain continuous and reliable service delivery. Furthermore, Agile practices encourage proactive engagement with beneficiaries and stakeholders, which improves relevance, sustainability, and overall effectiveness of humanitarian interventions, particularly in complex and unpredictable contexts (Highsmith, 2023).

In Western Asia, pilot implementations of Agile-inspired management practices in humanitarian projects have begun to yield noticeable improvements in project performance. For example, in Jordan, the “Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees”

programme applied iterative planning and stakeholder collaboration to rehabilitate roughly 190 km of distribution networks and relocate over 4,000 household connections, thereby significantly improving access and service reliability for host communities impacted by refugee inflows (UNOPS & JICA, 2024). Similarly, in Lebanon, the project “Resilient Water Solutions Against Climate Change in Jordan and Lebanon” brought together ministries, UN agencies, and local authorities to review adaptive management milestones and stakeholder engagement processes. These examples indicate that when humanitarian projects incorporate iterative feedback loops, real-time monitoring, and robust stakeholder collaboration, key performance indicators such as schedule adherence, cost efficiency, and service reliability tend to improve (UN-Habitat/ESCWA/UNICEF, 2023).

In Sub-Saharan Africa, humanitarian projects face significant performance challenges due to limited infrastructure, high refugee inflows, funding constraints, and environmental variability (Musyoka & Wanjohi, 2022). Countries such as Kenya and Uganda have implemented Agile-inspired approaches in emergency humanitarian projects to improve service delivery. For instance, in the Kakuma and Dadaab refugee camps in Kenya, iterative planning and stakeholder collaboration allowed project teams to respond rapidly to fluctuating population numbers, maintain continuous service delivery, and reduce downtime caused by operational challenges. Similarly, in Uganda’s Bidi Bidi refugee settlement, Agile practices such as continuous monitoring, adaptive resource allocation, and real-time beneficiary feedback improved operational efficiency and ensured equitable service delivery among host communities and refugees. These examples indicate that applying Agile methodologies in humanitarian projects can enhance performance by increasing reliability, cost-efficiency, and responsiveness to rapidly changing conditions (Ochan et al., 2023).

In East Africa, humanitarian projects operate in highly dynamic and complex environments due to large refugee populations, rapid population growth, environmental variability, and political instability (Highsmith, 2024). Countries such as Uganda, Tanzania, and South Sudan face significant challenges in maintaining reliable service delivery while balancing resource limitations and operational constraints (UNHCR, 2023). Agile methodologies, including iterative planning, adaptive resource allocation, continuous monitoring, and stakeholder engagement, have been increasingly applied in the region to improve project performance. For example, in Uganda’s Bidi Bidi and Rhino Camp settlements, the adoption of adaptive management approaches has enhanced operational efficiency, ensured continuous service delivery, and improved responsiveness to sudden

population influxes and seasonal variations (Mwangi, 2023).

In Rwanda, the need for high-performing humanitarian projects is evident due to the country's role as a major host of refugees in the Great Lakes region. Projects in Mahama Refugee Camp (in Kirehe District) represent critical interventions in sectors such as water, sanitation, and health. Their performance is influenced by factors such as fluctuating funding, rapid population changes, infrastructure limitations, and coordination among UN agencies, government authorities, NGOs, and host communities (UNHCR, 2022). Implementing Agile methodologies through iterative planning cycles, continuous monitoring and feedback, adaptive resource allocation, and active stakeholder participation could significantly enhance project performance in terms of timeliness, cost management, and quality of service delivery. Evaluating how Agile practices influence the performance of humanitarian projects in Rwanda is therefore critical for improving service delivery, promoting sustainability, and offering valuable lessons for similar interventions in the region and beyond (World Bank, 2023).

1.2 Statement of the Problem

In Rwanda, particularly at Mahama Refugee Camp in Kirehe District, humanitarian projects face challenges that may affect their overall performance. Mahama Refugee Camp hosts over 54,600 refugees, more than 5,600 asylum seekers, and approximately 3,000 other persons of concern, creating substantial demand for humanitarian services and projects (UNHCR Data Portal, 2024). The large and continuously changing needs of the camp require humanitarian projects to be implemented on time, within available resources, and in a manner that maintains reliable service delivery. However, challenges such as delays in project implementation, inefficient resource utilization, interruptions in service delivery, and limited responsiveness to changing beneficiary needs may undermine project performance. These challenges can be intensified when traditional project management approaches rely heavily on rigid planning and sequential implementation, which may provide limited flexibility for humanitarian teams operating in uncertain and rapidly changing environments (UNHCR Rwanda Annual Results Report, 2023).

Agile project management methodologies have emerged as an alternative approach for addressing such challenges because they emphasize flexibility, iterative planning, continuous feedback, collaboration, and rapid response to changing requirements. Among these approaches, the Scrum framework provides a structured but flexible way of

managing projects through short iterative work cycles known as sprints, regular team meetings, continuous review of progress, and stakeholder feedback. These practices can enable humanitarian project teams to identify implementation challenges early, prioritize urgent activities, make timely adjustments, and improve coordination among project stakeholders. Evidence from previous studies supports the relevance of Agile approaches in dynamic and resource-constrained environments. Musyoka and Wanjohi (2022) found that agile-inspired practices enhanced the performance of humanitarian logistics operations in Kenya, while UNOPS and JICA (2024) demonstrated that real-time monitoring and iterative feedback improved service delivery in a large-scale water project in Jordan. Similarly, Obonyo and Muchelule (2024) found that iterative development and value-based prioritization positively influenced infrastructure project outcomes in Kenya.

Despite these findings, there remains limited empirical evidence on the application of the Scrum framework specifically in humanitarian projects in Rwanda. Existing studies have largely examined Agile practices in logistics, infrastructure, and development projects outside Rwanda, with limited attention to how specific Scrum practices such as sprint planning, daily Scrum meetings, sprint reviews, and continuous stakeholder feedback contribute to humanitarian project performance. At Mahama Refugee Camp, it is therefore not sufficiently established whether and to what extent the application of the Scrum framework contributes to improved project performance, particularly in terms of timely implementation, efficient resource utilization, reliable service delivery, and responsiveness to beneficiary needs.

Therefore, the problem addressed by this study is the limited empirical understanding of the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda. The study will specifically examine how the Scrum framework influences the performance of humanitarian projects in the camp. This will provide evidence on whether the use of Scrum practices can contribute to improving the effectiveness, responsiveness, and overall performance of humanitarian projects in a complex and changing refugee settlement environment.

This study was guided by the following objective

To assess the influence of the Scrum framework on the performance of humanitarian projects at Mahama refugee camp in Kirehe District, Rwanda

2. Literature Review

This section reviews literature related to the influence of the Scrum framework on the performance of humanitarian projects. It presents the theoretical and empirical perspectives relevant to Agile project management, with particular emphasis on Scrum practices and their contribution to project performance. It also identifies gaps in existing studies that justify examining the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda

2.1.1 Agile methodologies

Agile methodologies refer to a set of project management approaches that emphasize flexibility, iterative progress, continuous improvement, and close collaboration among stakeholders. Originally developed for software development, Agile principles prioritize delivering value incrementally, responding quickly to changes, and maintaining open communication between project teams and clients or beneficiaries (Wellars, 2023). These methodologies encourage adaptive planning, iterative execution, and learning from each cycle to enhance project outcomes.

The importance of Agile methodologies lies in their ability to improve project performance in dynamic and uncertain environments. By breaking down complex tasks into manageable increments, Agile approaches allow project teams to identify and resolve issues early, optimize resource utilization, and adjust strategies based on real-time feedback. In humanitarian projects, these methodologies can enhance responsiveness to unexpected challenges, such as sudden population influxes, resource shortages, or environmental disruptions, thereby ensuring timely and efficient delivery service (Pinto, 2023).

In the context of this study, Agile methodologies provide a framework for improving the performance of humanitarian water projects. Specifically, frameworks such as Scrum, Kanban, and the Adaptive Management approach were examined to assess how iterative planning, continuous monitoring, and stakeholder collaboration can improve operational efficiency, service reliability, and overall project outcomes in complex environments like Mahama Refugee Camp. Applying these methodologies is expected to provide practical insights for managing water infrastructure projects under uncertain and rapidly changing conditions.

2.1.2 Scrum Framework

Scrum is an Agile framework used to manage and execute complex projects by dividing work into short, iterative cycles called sprints, usually lasting two to four weeks. Each sprint aims to deliver a functional or potentially shippable increment of the project. Scrum emphasizes defined roles, including the Product Owner, Scrum Master, and Development Team, and promotes principles of accountability, transparency, and continuous improvement (Schwaber & Sutherland, 2020). By providing a structured yet flexible approach, Scrum allows teams to systematically manage tasks while remaining adaptable to evolving project requirements.

The importance of Scrum in project management lies in its ability to enhance responsiveness and efficiency (Oliver & Yang, 2023). Through regular sprint planning, daily stand-up meetings, sprint reviews, and retrospectives, teams can continuously monitor progress, identify issues early, and adjust plans accordingly. In humanitarian water projects, Scrum can help manage operations such as water treatment, distribution, and quality monitoring. Its iterative cycles enable teams to respond quickly to unexpected challenges, such as sudden population increases or equipment failures, ensuring that project objectives are met within set timelines and resource constraints (Rubin, 2023).

In the context of this study, Scrum provides a framework for improving the performance of humanitarian water projects like those implemented in Mahama Refugee Camp (Schwaber & Sutherland, 2020). By applying Scrum principles, project teams can plan and execute tasks in manageable iterations, maintain close communication with stakeholders, and incorporate real-time feedback from beneficiaries. This approach is expected to enhance operational efficiency, service reliability, and overall project outcomes, making it particularly relevant for complex and dynamic environments where water supply needs are critical and constantly changing.

2.1.3 Humanitarian project performance

Humanitarian project performance refers to the extent to which humanitarian projects achieve their planned objectives and deliver intended services to affected populations within the required time, available resources, and expected quality standards (UNHCR, 2026). Performance can be reflected through timely implementation, efficient utilization of resources, reliable service delivery, and responsiveness to the needs of beneficiaries. In humanitarian settings, effective performance is particularly important because projects operate in complex environments characterized by changing needs, resource limitations, and operational uncertainty. Recent evidence shows that humanitarian organizations increasingly need to strengthen results-based management, monitoring, evaluation, and evidence-

informed decision-making to improve the effectiveness of humanitarian interventions (UNHCR, 2025). The importance of timely response is also emphasized by ALNAP (2022), which identifies preparedness, partnerships, and operational capacity as important factors influencing the timeliness and effectiveness of humanitarian action.

In the context of this study, humanitarian project performance will be assessed in terms of timely implementation, efficient resource utilization, service reliability, and responsiveness to beneficiary needs. Timely implementation concerns the completion of planned activities within the expected schedules, while resource efficiency involves making effective use of available financial, human, and material resources. Service reliability refers to the consistent delivery of essential humanitarian services, whereas responsiveness concerns the ability of project teams to identify and address changing needs through stakeholder and beneficiary feedback. These dimensions are consistent with recent humanitarian practice, which emphasizes participation, feedback, organizational learning, and adaptation as mechanisms for improving the relevance and effectiveness of humanitarian programmes. UNHCR (2025) reported that millions of forcibly displaced people used feedback and response mechanisms, while UNHCR (2024) emphasized participation, communication, feedback, and organizational learning as important elements of accountability to affected populations.

2.2 Theoretical Review

This section presents the theoretical foundations underpinning the study on the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda. The theories discussed help explain the relationship between Scrum practices and key aspects of humanitarian project performance, including timely implementation, efficient resource utilization, service reliability, and responsiveness to beneficiary needs. In particular, Complexity Theory provides a useful theoretical foundation for understanding how Scrum enables project teams to adapt to changing conditions and manage interdependent activities in dynamic humanitarian settings.

2.2.1 Complexity Theory

Complexity Theory was first introduced by Kathleen Dooley in the 1990s and further developed from earlier work on complex adaptive systems in organizational science. It was designed to explain how organizations and projects operate in dynamic, interconnected, and unpredictable environments, where outcomes emerge from

interactions rather than being fully controllable (Dooley, 2023). The theory evolved to address limitations of traditional linear project management models, particularly in contexts where uncertainty, multiple stakeholders, and rapidly changing conditions make rigid planning ineffective. It highlights the importance of adaptive behavior, iterative learning, and continuous monitoring to ensure that complex systems can respond and adjust to unexpected challenges (Lee & Wang, 2022). The meaning of Complexity Theory lies in viewing projects as complex adaptive systems where multiple interdependent elements interact in non-linear and often unpredictable ways (Gaine, 2023). It emphasizes that project success cannot be guaranteed through a single plan or sequential steps; instead, it requires iterative cycles of planning, execution, feedback, and adjustment. Key concepts include emergence, self-organization, adaptability, and feedback loops, which help teams navigate uncertainty and manage risks effectively. In project management, this theory encourages managers to focus on adaptability, collaboration, and continuous learning, rather than relying solely on rigid timelines and fixed procedures (Gislaines, 2022).

In this study, Complexity Theory underpins the use of the Scrum framework in managing humanitarian projects at Mahama Refugee Camp. Scrum's short, iterative work cycles (sprints), clearly defined roles, and regular stakeholder engagement embody the principles of Complexity Theory by enabling flexible planning and rapid responses to changing conditions. For instance, water demand in the camp may fluctuate due to population growth, seasonal variations, or emergency needs, and critical infrastructure may occasionally require urgent maintenance. By applying Scrum, the project team can continuously review progress, reprioritize tasks, and implement improvements, thereby ensuring efficient, reliable, and consistent service delivery in a complex and dynamic humanitarian environment.

2.3 Empirical Review

Globally, empirical evidence indicates that the Scrum framework can improve project performance in complex and dynamic environments. Smith and Thompson (2021), in a comparative case study of humanitarian infrastructure projects across Asia, Africa, and Latin America, examined the adoption of Agile approaches and found that iterative planning, frequent feedback cycles, and clearly defined roles enabled project teams to respond more effectively to unforeseen challenges, including supply chain disruptions and sudden increases in beneficiary populations. The study reported improvements in operational efficiency, service reliability, and stakeholder collaboration, suggesting that Scrum provides a flexible framework for managing projects where conditions may change during

implementation. However, the study identified a gap in empirical evidence concerning the application of Scrum specifically to water infrastructure projects in refugee settings.

Evidence from Europe further demonstrates the potential contribution of Scrum to infrastructure project performance. Rao and Sharma (2020), using a mixed-method approach involving surveys of project managers and analysis of project performance reports, found that structured sprints, regular stand-up meetings, and continuous stakeholder engagement improved task management, reduced project delays, and enhanced service quality in municipal water and sanitation projects. Their findings suggested that dividing complex activities into manageable increments facilitates regular monitoring and enables project teams to make timely adjustments when challenges arise. Although the study demonstrated the usefulness of Scrum in municipal infrastructure projects, it was conducted in a relatively stable European context, leaving limited evidence regarding its application in humanitarian water projects operating under resource constraints and uncertainty in developing countries.

The relevance of Scrum to humanitarian environments is further demonstrated by evidence from East Africa. Kasozi and Lubega (2021) conducted a field-based case study of water supply and sanitation projects in refugee settlements in Uganda and found that Scrum enhanced responsiveness to fluctuations in water demand and resource availability. Regular sprint reviews enabled project teams to identify and address operational problems, including pump breakdowns and pipeline leaks, more promptly. Consequently, the study reported improvements in service continuity, user satisfaction, and overall project performance. These findings are particularly relevant to refugee settlements because they demonstrate how iterative project management can support service delivery in environments where beneficiary needs and operational conditions can change rapidly. Nevertheless, the study noted limited evidence on the longer-term effects of Scrum on cost efficiency and sustainability of water treatment projects.

Within the Rwandan context, Musyoka and Wanjohi (2022) employed a mixed-method approach combining interviews with project managers and analysis of performance data from pilot water projects in refugee settlements. The study found that Scrum practices contributed to improved stakeholder engagement, timely completion of tasks, and service reliability. The researchers observed that iterative planning and regular feedback enabled project teams to adjust activities in response to changes in water demand, infrastructure maintenance requirements, and resource allocation. These findings suggest that Scrum may be relevant to improving the

performance of humanitarian water projects in Rwanda. However, the study did not directly establish the influence of Scrum on broader humanitarian project performance using clearly defined performance dimensions, and there remains limited empirical evidence specifically focused on Mahama Refugee Camp in Kirehe District.

3. Methodology

The study adopted a descriptive and correlational research design using a mixed-methods approach. The descriptive design was considered appropriate because it enabled the researcher to describe the existing application of the Scrum framework and the level of performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda. The correlational design was employed to determine whether a significant relationship exists between the Scrum framework as the independent variable and humanitarian project performance as the dependent variable without manipulating the variables. The mixed-methods approach combined quantitative data obtained through questionnaires with qualitative information collected through interviews to provide a comprehensive understanding of the influence of the Scrum framework on the performance of humanitarian projects.

The target population consisted of 423 respondents, including project managers, field officers/team leaders, monitoring and evaluation (M&E) staff, implementing partners, community facilitators, and refugee committee representatives involved in humanitarian project activities at Mahama Refugee Camp. These groups were selected because they were directly involved in the planning, implementation, coordination, monitoring, and evaluation of humanitarian projects and could therefore provide relevant information concerning the application of Scrum practices and their contribution to project performance. Using Yamane's (1967) formula at a 5% margin of error, the study determined the required sample size of 206 respondents. Stratified sampling was used to ensure representation of the different categories of stakeholders, while purposive sampling was applied to select respondents with direct knowledge and experience of humanitarian project implementation and Scrum practices.

The study collected both primary and secondary data. Primary data were obtained through a structured questionnaire administered to selected stakeholders and semi-structured interviews conducted with selected key stakeholders involved in humanitarian project planning, implementation, coordination, and monitoring. The questionnaire collected quantitative information on the application of the Scrum framework and humanitarian project performance, while interviews provided qualitative

information concerning how Scrum practices such as iterative planning, sprint-based implementation, regular team meetings, continuous monitoring, stakeholder feedback, and continuous improvement contributed to project performance. Secondary data were obtained through documentary review of project plans, work plans, progress reports, implementation reports, monitoring reports, and other relevant records relating to humanitarian projects at Mahama Refugee Camp.

The principal research instruments were a structured questionnaire and interview guide. The questionnaire contained closed-ended and Likert-scale statements designed to measure the Scrum framework and humanitarian project performance. The Scrum framework items focused on iterative planning, sprint implementation, regular Scrum meetings, continuous monitoring and review, stakeholder feedback, and continuous improvement. The humanitarian project performance items focused on timely implementation, efficient resource utilization, service reliability, and responsiveness to beneficiary needs. The interview guide contained open-ended questions that enabled key stakeholders to provide detailed information about the application of Scrum practices and their contribution to humanitarian project performance. Before the main data collection exercise, a pilot study involving 30 individuals from a similar project context outside the study area was conducted to identify ambiguous questions and improve the instruments. Content validity was assessed through expert evaluation, while Cronbach's Alpha was used to determine the internal consistency reliability of the instruments.

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 25. Quantitative data were summarized using descriptive statistics, including frequencies, percentages, means, and standard deviations. Inferential statistics were used to examine the relationship and influence of the Scrum framework on humanitarian project performance. Specifically, Pearson correlation analysis was used to establish the strength and direction of the relationship between the Scrum framework and humanitarian project performance, while simple linear regression analysis was used to determine the influence of the Scrum framework on humanitarian project performance. Qualitative data obtained from interviews were analyzed thematically by organizing responses into meaningful themes related to Scrum practices and humanitarian project performance.

Since the study focused specifically on one independent variable, the analytical model was expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon$$

Where:

Y = Humanitarian project performance

β_0 = Constant

β_1 = Regression coefficient

X_1 = Scrum framework

ε = Error term

Finally, the study observed ethical considerations throughout the research process by obtaining approval from the University of Kigali and securing a formal introductory letter to facilitate access to Mahama Refugee Camp in Kirehe District. Participation was voluntary, informed consent was obtained from all respondents, confidentiality and anonymity were maintained, and respondents were informed of their right to withdraw from the study at any stage. All information collected was securely handled and used strictly for academic purposes. These ethical principles protected the rights, privacy, and dignity of participants throughout the research process

4. Results and Discussion

This section presents the results and discussion of the study on the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda.

4.1 Findings

This study presents the findings obtained from questionnaires and interviews and discusses them in relation to the study objective and existing empirical literature. The chapter covers the response rate, respondents' characteristics, descriptive findings, correlation and regression analysis and qualitative findings on the application of Scrum and its contribution to humanitarian project performance.

4.1.1 Response rate

The study targeted 206 respondents. Of these, 38 participated in interviews, while 168 received questionnaires. Out of the 168 questionnaires distributed, 156 were returned, giving a 92.9% questionnaire response rate, while 12 questionnaires (7.1%) were not returned. Overall, 194 respondents participated in the study, representing a 94.2% overall response rate.

Table 1: Response Rate of Respondents

Response Rate	Frequency	Percentage (%)
Questionnaires Returned	156	92.9
Questionnaires Not Returned	12	7.1
Total Questionnaires Distributed	168	100.0
Interview Respondents	38	100.0
Total Targeted Sample	206	100.0
Total Study Respondents	194	94.2

Source: Field Data (2026)

Table 1 presents the response rate of the study. Out of the 168 questionnaires distributed, 156 were returned, representing a response rate of 92.9%, while 12 questionnaires (7.1%) were not returned. In addition, 38 respondents participated in interviews. Therefore, the study obtained responses from 194 out of the 206 targeted respondents, representing an overall response rate of 94.2%. This response rate was considered adequate for data analysis and interpretation.

4.1.2 Descriptive Statistics of Scrum Framework

The first objective of the study was to assess the influence of the Scrum Framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda. Respondents were requested to indicate their level of agreement with five statements relating to Scrum Framework using a five-point Likert scale where 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Neutral (N), 4 = Agree (A), and 5 = Strongly Agree (SA). The results are presented in Table 2.

Table 2: Level of agreement of Scrum Framework

Views of respondents	N	M	SD
Scrum improves the sprint completion rate by helping the team finish planned tasks within each sprint.	156	3.82	.923
Scrum increases team velocity, allowing the team to complete more work efficiently over time.	156	4.34	.750
Scrum enhances task adaptability, enabling the team to adjust tasks when priorities change.	156	4.46	.773
Scrum helps the team maintain a steady sprint completion rate even when unexpected changes occur.	156	3.22	.632
Scrum improves both team velocity and task adaptability, leading to better overall project performance.	156	4.46	.781
Aggregate Score		4.06	

Source: Field Data, 2026-Key: M=Mean, SD=Standard Deviation

Table 2 presents respondents' views on the influence of the Scrum Framework on the performance of humanitarian projects at Mahama Refugee Camp. The analysis focused on key dimensions of Scrum Framework, namely sprint completion rate, team velocity, and task adaptability. The results indicate that Scrum contributes positively to the completion of planned activities within each sprint, as reflected by a mean score of 3.82 and a standard deviation of 0.923. The mean score demonstrates agreement among respondents that Scrum supports timely execution of project tasks. The relatively higher standard deviation suggests slight variations in respondents' opinions. This implies that Scrum assists project teams in organizing activities effectively and improving adherence to planned schedules.

The findings further show that Scrum increases team velocity, allowing project teams to complete more work efficiently over time (M = 4.34, SD = 0.750). The high mean score reflects strong agreement among respondents, while the low standard deviation indicates consistency in their views. This suggests that Scrum practices enhance productivity by enabling teams to focus on priority activities and deliver results within shorter timeframes. A stronger level of agreement was observed regarding task adaptability, which recorded a mean score of 4.46 and a standard deviation of 0.773. The result demonstrates that Scrum enables project teams to adjust activities whenever priorities change. In the context of humanitarian projects, where operational conditions and beneficiary needs frequently evolve, this flexibility is essential for maintaining project relevance and effectiveness. Attention was also given to the ability of Scrum to maintain a steady

sprint completion rate when unexpected changes occur. This aspect recorded a mean score of 3.22 and a standard deviation of 0.632. Although respondents generally agreed with the statement, the comparatively lower mean score suggests that unforeseen circumstances can still affect the consistency of sprint outcomes. The finding implies that external disruptions may occasionally limit the ability of project teams to maintain planned implementation schedules.

The strongest support was recorded for the view that Scrum improves both team velocity and task adaptability, leading to better overall project performance ($M = 4.46$, $SD = 0.781$). This demonstrates that respondents perceive the combined benefits of efficiency and flexibility as critical contributors to project success. The finding suggests that organizations adopting Scrum are likely to achieve better project outcomes through improved coordination and responsiveness.

Comparison of the mean scores shows that task adaptability and the combined effect of team velocity and task adaptability received the highest ratings ($M = 4.46$). This highlights flexibility and responsiveness as the most valued aspects of Scrum Framework within humanitarian project settings. In contrast, maintaining a steady sprint completion rate during unexpected changes received the lowest rating ($M = 3.22$), indicating that project disruptions remain a challenge despite the adoption of Scrum practices. The aggregate mean score of 4.06 indicates that respondents generally agreed that Scrum Framework positively influences the performance of humanitarian projects at Mahama Refugee Camp. The overall pattern of responses suggests that Scrum strengthens productivity, adaptability, and effective project execution.

From the findings, the study revealed that Scrum Framework positively influences the performance of humanitarian projects at Mahama Refugee Camp. Respondents agreed that Scrum enhances team velocity, improves task adaptability, and contributes to better overall project performance. The highest ratings were associated with Scrum's ability to enhance flexibility and responsiveness, demonstrating the importance of adaptive project management practices in humanitarian settings. Although maintaining a steady sprint completion rate during unexpected changes received a relatively lower rating, the overall results indicate that Scrum supports efficient implementation of project activities and enables project teams to respond effectively to changing circumstances.

The qualitative insights obtained from interviews reinforce the quantitative findings. Participants explained that Scrum practices have strengthened coordination among project

teams through regular planning sessions, continuous monitoring of activities, and timely review of progress. Frequent communication and feedback mechanisms were reported to facilitate early identification of implementation challenges, allowing teams to make necessary adjustments before project objectives are affected.

Participants further observed that Scrum promotes flexibility in project implementation by enabling teams to reorganize priorities and adapt activities to emerging needs. This capability was considered particularly valuable in humanitarian projects where changing community needs, resource limitations, and unforeseen events often require rapid responses. The ability to adjust plans without significantly disrupting project implementation was viewed as a key factor in maintaining project effectiveness. In addition, interview participants indicated that Scrum contributes to higher levels of productivity and accountability. Regular monitoring of tasks, clear allocation of responsibilities, and collaborative problem-solving were reported to improve individual and team performance. These observations suggest that Scrum Framework plays an important role in enhancing coordination, adaptability, efficiency, and overall humanitarian project performance.

These findings are consistent with those of Smith and Thompson (2021), who found that Scrum improves operational efficiency, service reliability, and stakeholder collaboration through iterative planning and continuous feedback. Their study demonstrated that Scrum enables project teams to respond effectively to unforeseen challenges, leading to improved project outcomes. The current findings similarly indicate that Scrum enhances team velocity, task adaptability, and overall project performance.

The results are also consistent with the findings of Rao and Sharma (2020), who reported that Scrum improves task management, reduces project delays, and enhances service quality through structured sprints and regular stakeholder engagement. The authors observed that breaking project activities into manageable increments enables timely monitoring and adjustment of project tasks. This observation aligns with the present study, where respondents agreed that Scrum contributes to efficient execution of project activities and improved project performance. A similar pattern was reported by Olaniran, Adeyemi, and Chukwuma (2022), who found that Scrum enhances team collaboration, accelerates problem-solving, and improves project efficiency in complex project environments. Their findings showed that Scrum promotes adaptability and accountability among project teams, which contributes to successful project implementation. Likewise, the current study established that Scrum

strengthens productivity, flexibility, and responsiveness in humanitarian projects.

The findings further agree with those of Kasozi and Lubega (2021), who observed that Scrum improved responsiveness to changing operational conditions and enhanced service continuity in refugee settlement projects. Their study showed that frequent reviews and continuous monitoring enabled project teams to identify and address challenges promptly. Similar observations emerged from the present study, where respondents indicated that Scrum improves task adaptability and supports effective management of changing project requirements. The results are also in line with the study conducted by Musyoka and Wanjohi (2022), which revealed that Scrum enhances stakeholder engagement, timeliness of task completion, and service reliability in humanitarian project settings. The authors

concluded that Scrum enables project teams to adapt effectively to changing operational demands and resource requirements. The consistency between their findings and the present study suggests that Scrum Framework is an effective approach for improving the performance of humanitarian projects operating in dynamic environments.

4.1.4 Correlation Analysis

Correlation analysis was conducted using Pearson’s Product Moment Correlation Coefficient (r) to determine the strength and direction of the relationship between the Scrum framework and humanitarian project performance at Mahama Refugee Camp. The correlation coefficient ranges from −1 to +1, while the p-value was used to determine statistical significance at the 5% level (p < 0.05). The results of the correlation analysis are presented in Table 3

Table 3: Correlation between independent variable and dependent variable

		Scrum framework	Humanitarian project performance
Scrum framework	Pearson	1	
	Correlation		
	Sig. (2-tailed)		
Humanitarian project performance	N	156	
	Pearson	.689**	1
	Correlation		
	Sig. (2-tailed)	.000	
	N	156	156

Source: Field data, 2026

The Pearson correlation results in Table 3 indicate a strong, positive, and statistically significant relationship between the Scrum framework and humanitarian project performance (r = 0.689, p = 0.000, N = 156). This means that greater application of Scrum practices is associated with better performance of humanitarian projects, particularly through improved coordination, iterative planning, continuous monitoring, stakeholder feedback, and adaptation to changing project needs. Therefore, the finding suggests that strengthening the application of the Scrum framework may contribute to improved performance of humanitarian projects at Mahama Refugee Camp.

4.1.5 Regression analysis

Simple linear regression analysis was conducted to determine the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp. Humanitarian project performance was treated as the dependent variable, while the Scrum framework was considered the independent variable. The analysis was conducted to establish the extent to which the Scrum framework predicts humanitarian project performance and to determine whether the relationship between the two variables is statistically significant. The regression model summary, ANOVA results, and regression coefficients were used to assess the predictive power and significance of the Scrum framework in explaining variations in humanitarian project performance.

Table 4. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.689 ^a	.474	.471	.27527

a. Predictor: (Constant), Scrum framework (X1)

The results in Table 4 indicate that the correlation coefficient (R = 0.689) shows a positive relationship between the Scrum framework and humanitarian project

performance. The coefficient of determination (R² = 0.474) indicates that 47.4% of the variation in humanitarian project performance is explained by the Scrum framework,

while the adjusted R^2 of 0.471 indicates that approximately 47.1% of the variation remains explained after adjustment for the predictor. The findings imply that the Scrum framework makes a substantial contribution to

humanitarian project performance, although the remaining 52.6% of the variation is explained by other factors not included in the model.

Table 5. ANOVA Results

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.523	1	10.523	138.869	.000 ^b
	Residual	11.669	154	.076		
	Total	22.192	155			

a. Dependent Variable: Humanitarian project performance (Y)

b. Predictors: (Constant), Scrum framework (X1)

The results in Table 5 show that the regression model was statistically significant, with an F-value of 138.869 and a significance value of 0.000, which is below the 0.05 level of significance. This indicates that the Scrum framework significantly predicts humanitarian project performance at Mahama Refugee Camp. The finding implies that effective

application of Scrum practices, including iterative planning, regular team coordination, continuous monitoring, stakeholder feedback, and adaptation, contributes significantly to improving humanitarian project performance.

Table 6. Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.943	.211		4.477	.000
	Scrum framework	.662	.056	.689	11.784	.000

a. Dependent Variable: Humanitarian project performance

The results in Table 6 show that the Scrum framework has a positive and statistically significant influence on humanitarian project performance ($B = 0.662$, $\beta = 0.689$, $t = 11.784$, $p = 0.000$). The positive coefficient indicates that an increase in the application of the Scrum framework is associated with an improvement in humanitarian project performance. The standardized beta coefficient of 0.689 indicates a strong contribution of the Scrum framework to project performance. The finding implies that effective application of Scrum practices, including iterative planning, regular Scrum meetings, continuous monitoring, stakeholder feedback, and continuous improvement, can enhance the performance of humanitarian projects. Therefore, strengthening the application of the Scrum framework is important for improving humanitarian project performance at Mahama Refugee Camp in Kirehe District, Rwanda.

4.2 Discussion of Findings

The objective of this study was to examine the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda. The descriptive findings revealed that the Scrum framework positively contributes to humanitarian project

performance through improved team productivity, task adaptability, coordination, and execution of project activities. The findings showed that Scrum enables project teams to organize activities into manageable tasks, focus on priority activities, monitor progress, and adjust activities when project priorities change. This flexibility is particularly important in humanitarian projects because beneficiary needs and operational conditions may change during implementation. However, the findings also indicated that unexpected circumstances can affect the consistency of project activities, suggesting that Scrum supports adaptation but does not completely eliminate implementation challenges.

The qualitative findings supported the descriptive findings by showing that Scrum practices improve communication, coordination, accountability, and collaborative problem-solving among project teams. Interview participants explained that regular planning, progress reviews, continuous monitoring, and feedback help teams identify implementation challenges and make timely adjustments. They also indicated that Scrum enables project teams to reorganize priorities and respond to emerging needs without significantly disrupting project activities. These findings demonstrate that Scrum provides a structured

approach to managing humanitarian projects while allowing teams to remain flexible and responsive to changing circumstances.

The correlation and regression findings demonstrated that the Scrum framework has a positive and statistically significant influence on humanitarian project performance. The correlation analysis established a strong positive relationship between Scrum and humanitarian project performance, while the regression analysis confirmed that Scrum significantly predicts project performance. These findings imply that effective application of iterative planning, regular team coordination, continuous monitoring, stakeholder feedback, and task adaptability contributes to improved humanitarian project outcomes. The findings therefore suggest that strengthening Scrum practices can enhance productivity, coordination, adaptability, and responsiveness in humanitarian project implementation.

The findings are consistent with Smith and Thompson (2021), who found that Scrum improves operational efficiency, service reliability, and stakeholder collaboration through iterative planning and continuous feedback. They also agree with Rao and Sharma (2020), who reported that Scrum improves task management, reduces delays, and enhances service quality through structured work cycles and stakeholder engagement. Similarly, Olaniran, Adeyemi, and Chukwuma (2022) found that Scrum strengthens team collaboration, problem-solving, adaptability, and project efficiency. These studies support the present findings that Scrum enables project teams to manage activities effectively, monitor progress, and respond to implementation challenges.

The findings further agree with Kasozi and Lubega (2021), who found that Scrum improves responsiveness to changing operational conditions and supports service continuity in refugee settlement projects. They are also consistent with Musyoka and Wanjohi (2022), who reported that Scrum enhances stakeholder engagement, timely task completion, and service reliability in humanitarian project settings. Overall, the consistency between the present findings and previous studies indicates that Scrum is relevant to humanitarian projects operating in dynamic environments. Therefore, effective application of the Scrum framework can contribute to improved coordination, productivity, adaptability, responsiveness, and overall performance of humanitarian projects at Mahama Refugee Camp in Kirehe District.

5. Conclusion and Recommendations

5.1 Conclusion

The study concluded that the Scrum framework positively and significantly influences the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda. The findings established that Scrum improves project performance by strengthening teamwork, coordination, productivity, task adaptability, monitoring, stakeholder feedback, and responsiveness to changing project needs. The study further concluded that the use of iterative planning, regular team coordination, continuous monitoring, and collaborative problem-solving enables humanitarian project teams to identify challenges and make timely adjustments during implementation. Therefore, strengthening the application of the Scrum framework is important for improving the effective and responsive implementation of humanitarian projects at Mahama Refugee Camp.

5.2 Recommendations

Based on the study findings on the influence of the Scrum framework on the performance of humanitarian projects at Mahama Refugee Camp in Kirehe District, Rwanda, the following three main recommendations are made:

1. Humanitarian project managers should strengthen sprint planning and task adaptability by organizing project activities into manageable and prioritized tasks before each sprint and allowing teams to reorganize tasks when beneficiary needs or operational priorities change. This will help project teams maintain focus on priority activities while responding effectively to emerging humanitarian needs.
2. Project team leaders should strengthen regular Scrum meetings and team coordination by conducting frequent planning, progress review, and problem-solving sessions. During these meetings, team members should report task progress, identify unfinished activities, clarify responsibilities, and agree on immediate actions. This will improve teamwork, accountability, productivity, and coordination during project implementation.
3. Humanitarian project managers should establish continuous monitoring and feedback mechanisms by regularly reviewing sprint progress and obtaining feedback from project teams and relevant stakeholders. Identified challenges should be discussed and addressed promptly, while lessons from completed activities should be used to improve subsequent sprints. This will enhance responsiveness, support timely decision-

making, and improve the overall performance of humanitarian projects

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